

Taxonomic Revision of the *longiscapus*-group of *Arcuphantes*
(Araneae: Linyphiidae) in Western Japan, with a Note
on the Concurrent Diversification of Copulatory
Organs between Males and Females

Yoh IHARA¹⁾

井原 庸¹⁾: 西日本のナガエヤミサラグモ種群の分類学的改訂
および雌雄の交尾器官の協同的多様化

Abstract The *longiscapus* group in the genus *Arcuphantes* (Linyphiidae) is revised based on genital morphology and geographic distributional pattern. This group should be treated as a closely related species group or a single superspecies by their morphology and distribution. Three known species, *A. longiscapus*, *A. hibanus* and *A. iharai*, and five new species, *A. saitoi*, *A. setouchi*, *A. tsurusakii*, *A. nojimai* and *A. okiensis* are described. These eight species are only distributed in western Honshu, northeastern Shikoku and some adjacent islands, Japan. It gives parapatric pattern to the distribution except for some cases of narrow overlap. Morphological correspondence between male palp and epigynum was found as a species-specific character.

Twenty species of the genus *Arcuphantes* (Linyphiidae) have been described from various areas of Japan. However, their taxonomy is still far from complete, and there are many undescribed species even in the main islands of Japan. What makes the taxonomy more complicated is the remarkable geographic differentiation in their copulatory organs exhibited by the species of the genus.

In this paper, I deal with eight species of the genus *Arcuphantes* (*longiscapus*, *hibanus*, *iharai* and five new species), which are closely related to each other, from western Honshu, Shikoku and some adjacent islands, Japan. The purpose of this paper is to present geographic distribution and variation in these species with descriptions of five new species. This paper is the third in a series of a biogeographical survey of the spiders in the Chugoku district, western Honshu, and also constitutes my first taxonomic study of the genus *Arcuphantes* in Japan.

As these eight species show close similarities in the morphological characters, they should be treated as a closely related species group or a single superspecies, which can be designated as the *longiscapus*-group. The fact that the geographical range of the group is a mosaic of small ones occupied by each species supports this treatment. To delimit the species within the group, I took following three steps. First, I adopted partial overlap in the distribution of two neighboring forms (e.g.

1) Yagi 7-15-21, Asaminami-ku, Hiroshima, 731-01 Japan

〒731-01 広島市安佐南区八木7丁目 15-21

Accepted November 30, 1995

hibanus and *saitoi*) as an evidence of two different species which are reproductively isolated. Secondly, two allopatric forms were considered as independent species when their morphological gap surpassed that exhibited by two forms with partial sympatry. Thirdly, two allopatric forms, which resemble each other, were also treated as independent species when their distributional ranges were widely separated by the intervening other species.

The type specimens designated in this paper and the voucher specimens which were used to illustrate geographic variation are deposited in the National Science Museum (Natural History), Tokyo. Other specimens are in my personal collection. The specimens other than the type series are listed in the last chapter.

The *longiscapus*-group of the Genus *Arcuphantes*

Distribution and relationship

Although the members of the genus *Arcuphantes* occur in most of Japan from Hokkaido to Kyushu, each species has a very limited distributional range. Also these eight species described here are only distributed in western Honshu, north-eastern Shikoku, some islands in the Seto Inland Sea and the Oki Islands, Japan (Fig. 1). Each species of them occupies a fragment within an overall geographic range of the group and the specific ranges directly abut each other. It gives parapatric pattern to the distribution except for some cases of narrow overlap.

On the other hand, these species share following characteristics which may represent synapomorphic states: 1) a long and slender epigynal scape with a hooked apex and a pair of small apophyses, 2) paracymbium of male palp widely covered with an apical part of lamella at the lateral side (though, paracymbium sometimes spreads out of lamella, especially in males presumed to be in a postcopulatory stage), 3) a long and plumose tufted membranous appendage on basal part of male palpal lamella (Fig. 2B).

These facts and their distributions suggest that they constitute a single monophyletic species group to which I propose the name *longiscapus*-group. Among the other Japanese species of *Arcuphantes*, only *A. hokkaidanus* SAITO, 1992, which has been recorded from Hokkaido, northern Japan, possesses these characters. Therefore, also this species can be considered as a member of the species group.

Diagnostic characters

As these eight species of the *longiscapus*-group show stereotyped external morphology, diagnosis of each species relies primarily upon genital morphology of both sexes. In males, principal differences are in the shapes of paracymbium and lamella of palp. In females, shape and size of basal part (degree of bend, swell and width) of epigynum and length of scape are useful for discrimination.

In a copulating pair of *A. iharai* which was successfully fixed intact in alcohol (collected on 25-III-1990 from Hogaki, Mukaihara-chô, Hiroshima Pref.), epigynum of the female was firmly held by a paracymbium and a lamella of the male palp, as shown in Fig. 2A. Close examination of their copulatory organs revealed that the

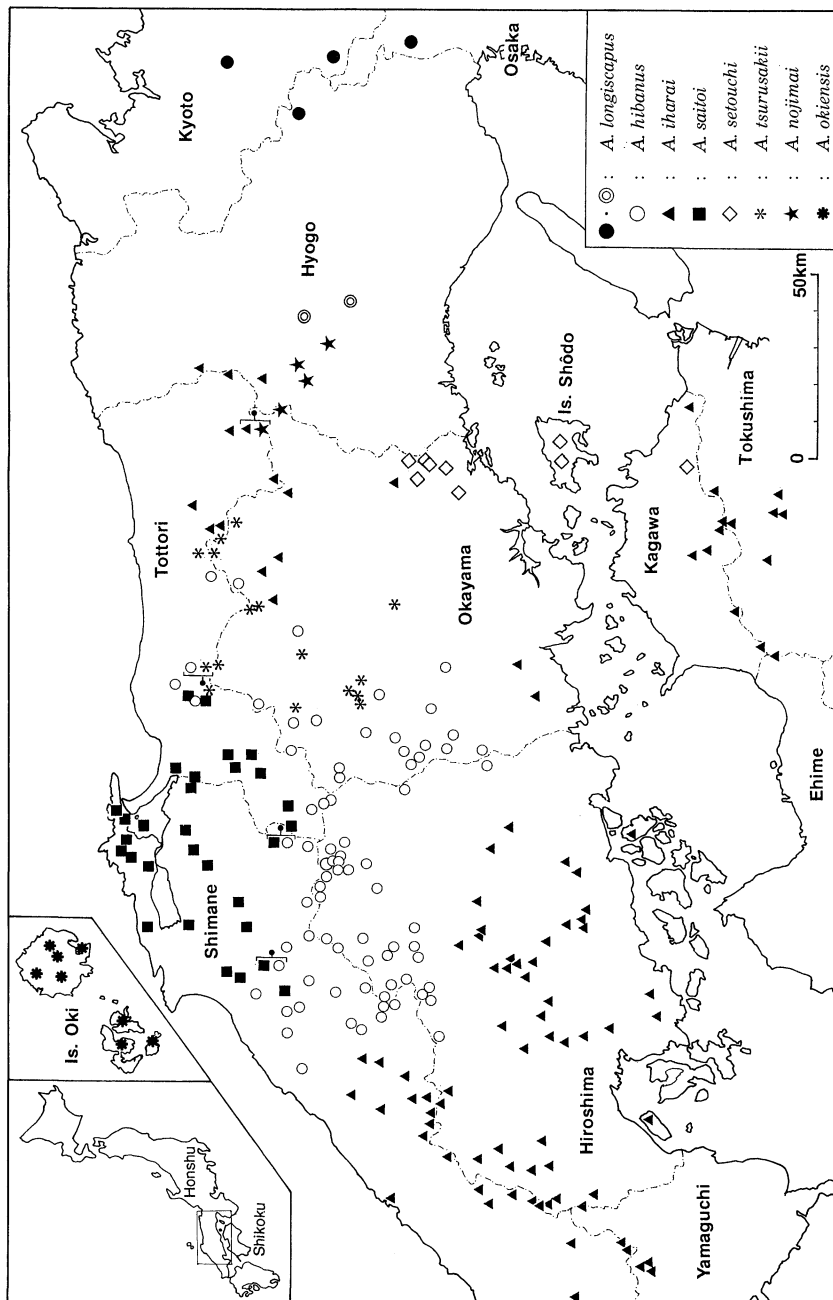


Fig. 1. Distribution of eight species belonging to the *longiscapus*-group of *Arcuphantes* in the Chugoku district and northern part of Shikoku.

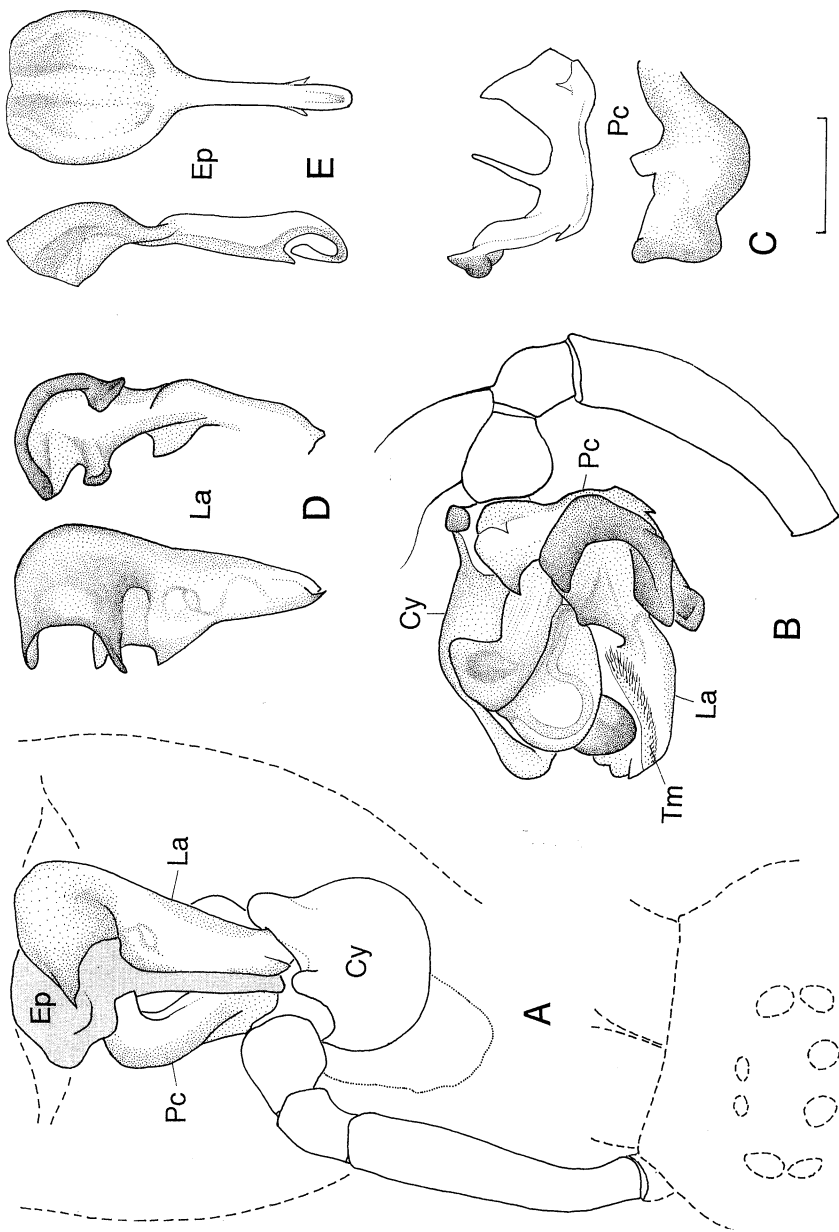


Fig. 2. The copulatory organs of *Arcuphantes iharai*. A, Positions of male palp and female epigynum in functional contact during copulation. B-D, Male left palp: B, ectal view; C, paracymbium; D, lamella. E, Female epigynum: left, lateral view; right, ventral view. A, C-E, Hogaki, Mukaihara-chô, Hiroshima Pref., B, Shimokôchi, Kôchi-chô, Hiroshima Prefecture. (Cy, cymbium; Pc, paracymbium; La, lamella; Tm, tufted membranous appendage; Ep, epigynum. Scale: 0.2 mm.)

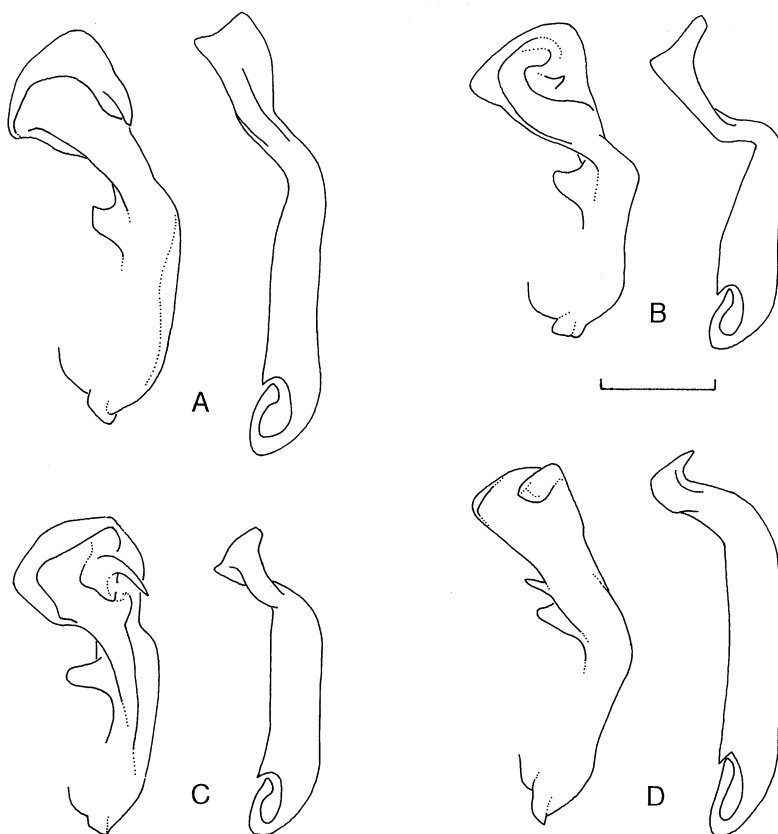


Fig. 3. Morphological correspondence of male palpal lamella (left) and female epigynum (right). A, *Arcuphantes longiscapus*: Ôkawachi-chô, Hyogo Prefecture. B, *A. hibanus*: Kumano Shrine, Saijô-chô, Hiroshima Prefecture. C, *A. saitoi*: male holotype and female paratype. D, *A. tsurusakii*: male holotype and female paratype. (Scale: 0.2 mm.)

morphology of ectal surface of the lamella corresponds well with that of female epigynum in the lateral view, as it were stamped with the latter. Such a morphological correspondence between female epigynum and male palpal lamella are also found in the other species of the group (Fig. 3). These facts suggest that these species-specific characters may have evolved through a coevolutionary runaway process generated by the sexual selection by female choice (EBERHARD, 1985; HUBER, 1993).

Description of the *longiscapus*-group

The general features of the species belonging to the group are as follows.

Male. Carapace rather round, but narrowed anteriorly. Eyes fairly large, and subequal in size except for the smaller anterior median eyes. Anterior eye

row just or almost straight in the frontal view, posterior eye row slightly recurved in the dorsal view. Clypeus concave immediately below eyes, slightly shorter than the length of median ocular area. Chelicerae: promargin of fang furrow with two teeth; fang sinuous and widened at the middle. Sternum convex, heart-shaped, sparsely with long bristles. Legs long and slender, leg I the longest and leg III the shortest. Metatarsus IV without a trichobothrium. Tm I: 0.14–0.21. Spines of legs: femur I with 1 prolateral spine; tibia I with 2 dorsal, 1 prolateral and 1 retrolateral spines; tibia II with 2 dorsal and 1 retrolateral spines; tibiae III–IV each with 2 dorsal spines; metatarsi I–III each with 1 dorsal spine. Abdomen anteriorly dorsally arched and posteriorly rather pointed.

Palp (Fig. 2B–D): patella and tibia short, each with a long stout bristle; cymbium dorso-medially with one or two hooks; paracymbium broad and curved toward the apex, basally with a large triangular protuberance with a minute process, medially with an elongated apophysis; lamella well developed.

Coloration. Carapace light yellowish brown to orange and suffused with dark grayish brown. Chelicerae more reddish than carapace. Sternum dark grayish brown. Legs light yellowish brown to orange, occasionally with dark grayish annulation. Abdomen dark grayish brown, dorsally with pale and white markings, ventrally with two pairs of white patches.

Female. Similar to male in general, but differ from it in the following points. Carapace rather oval. Chelicerae: fangs not modified; promargin of fang furrow with 3 teeth and retromargin with 5 (sometimes 4) small teeth. Spines of legs: femur I with 1 prolateral spine; tibia I with 2 dorsal, 1 prolateral, 1 retrolateral and 2 ventral spines; tibia II with 2 dorsal, 1 retrolateral and 1 ventral spines; tibiae III–IV each with 2 dorsal spines; metatarsi I–III each with 1 dorsal spine. Abdomen larger than that of male.

Epigynum (Fig. 2E): scape long and slender with hooked apex; a pair of small apophyses on base of hook; basal part somewhat wide and bent.

Arcuphantes longiscapus (Oi, 1960)

(Figs. 4A–B, 5A–B, 6A–B)

Fusciphantes longiscapus Oi, 1960, p. 200, figs. 261–267. (Type locality: Minoo, Osaka Pref.)

Diagnosis. Distinguishable from the other species of the group by the genital organs. Male palp: cymbium with a hook; paracymbium distal half broad (Fig. 4A–B); lamella as shown in Fig. 5A–B. Epigynum relatively long, basal part wide and slightly bent (Fig. 6A–B).

Distribution. Northern part of Osaka Pref., southwestern part of Kyoto Pref. and Hyogo Pref., western Honshu (Fig. 1).

Variation. This species includes two geographic forms distinguished by details of male palp and female epigynum from one another. Their distributions are allopatric with each other and probably do not come into contact. One form occurs in populations occupying the most part of the species distributional range; northern part of Osaka Pref. including type locality, southwestern part of Kyoto Pref. and eastern part of Hyogo Pref. (Fig. 1, solid circles). Another form has been found only in Kanzaki-gun, central part of Hyogo pref. (Fig. 1, double circles). This form is

distinguished from the former by long epigynum with slightly swollen basal part (Fig. 6A–B) and correlated long lamella of male palp (Fig. 5A–B). On the other hand, length of legs varies among the populations; the former has relatively long legs in this group, compared with the latter having shorter.

Remarks. *A. longiscapus* was originally described by Oi (1960) under the genus *Fusciphantes*, newly erected, with other species of the genus. However, *Fusciphantes* was considered to be a junior synonym of *Arcuphantes* CHAMBERLIN et IVIE, 1943 in his next paper (Oi, 1964).

***Arcuphantes hibanus* SAITO, 1992**

(Figs. 4C–E, 5C–E, 6C–D)

Arcuphantes hibanus SAITO, 1992, p. 30, figs. 27–29. (Type locality: Mt. Dôgo-yama, Hiba-gun, Hiroshima Pref.)

Diagnosis. Distinguishable from the other species of the group by the genital organs. Male palp: cymbium with a hook; paracymbium and lamella as shown in Figs. 4C–E and 5C–E. Epigynum intermediate in size in the group, basal part strongly crooked and concaved (Fig. 6C–D).

Distribution. Northeastern part of Hiroshima Pref., central part of Shimane Pref., western part of Okayama Pref. and eastern part of Tottori Pref., western Honshu (Fig. 1).

Variation. Two main geographic forms, which are parapatrically distributed in the eastern and the western parts within the range, respectively, are distinguished by the shape of epigynum. Furthermore, the western populations are divided into two subgroups by the shape of male palpal paracymbium and lamella. Coloration pattern of the legs also varies geographically; that is, two geographic forms, each

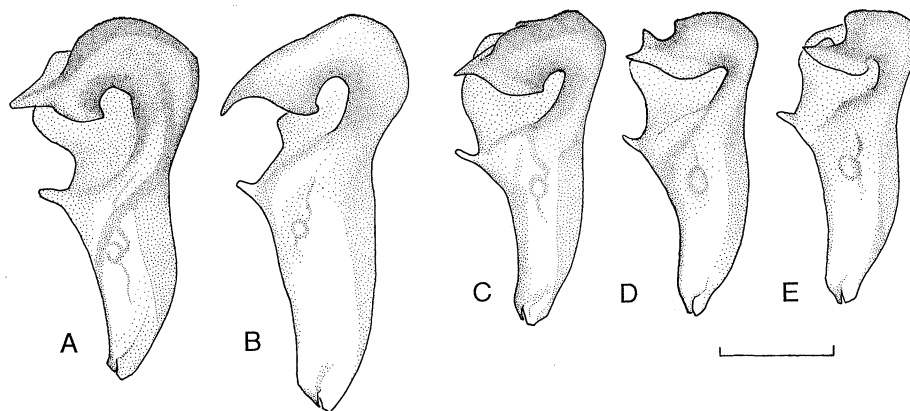


Fig. 4. Male palpal paracymbium of *Arcuphantes longiscapus* and *A. hibanus*. A–B, *A. longiscapus*: A, Minoo Park, Osaka Pref. (near the type locality); B, Ôkawachi-chô, Hyogo Prefecture. C–E, *A. hibanus*: C, Kumano Shrine, Saijô-chô, Hiroshima Pref.; D, Anagasa-machi, Miyoshi-shi, Hiroshima Pref.; E, Mt. Sanbe, Shimane Prefecture. (Male left palp. Scale: 0.2 mm.)

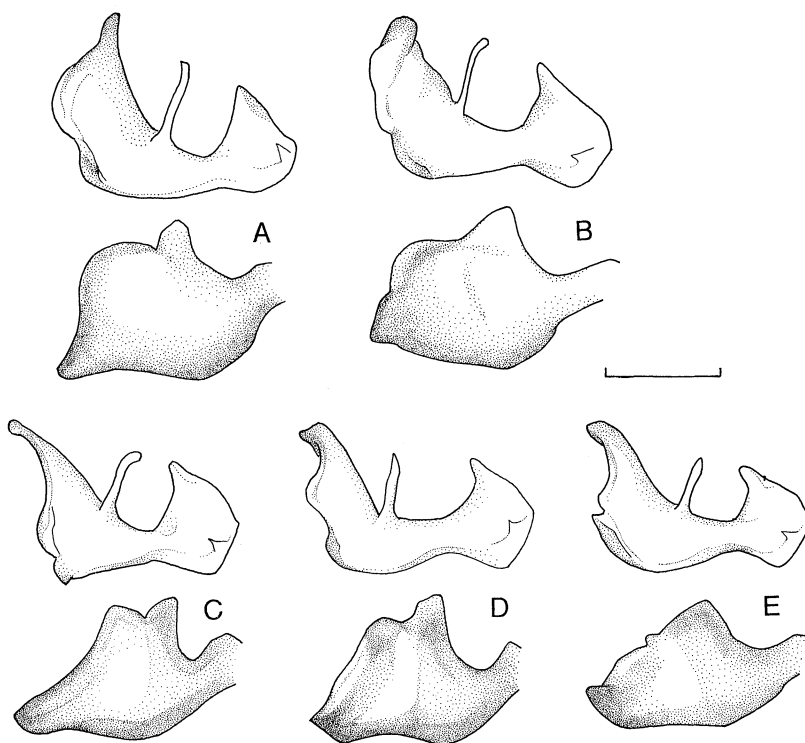


Fig. 5. Male palpal lamellae of *Arcuphantes longiscapus* and *A. hibanus*. A–B, *A. longiscapus*: A, Minoo Park, Osaka Pref. (near the type locality); B, Ôkawachi-chô, Hyogo Prefecture. C–E, *A. hibanus*: C, Kumano Shrine, Saijô-chô, Hiroshima Pref.; D, Anagasa-machi, Miyoshi-shi, Hiroshima Pref.; E, Mt. Sanbe, Shimane Prefecture. (Male left palp. Scale: 0.2 mm.)

with or without an annulation respectively, can be distinguished in this trait. Distributional pattern of the forms recognized in the coloration roughly corresponds to that of epigynal shape (Fig. 7).

Remarks. This species resembles *A. longiscapus* even in the details of the genital organs which are principal diagnostic characters in this genus. Then, there is no essential difference between the relation between these two species and that between the two geographic forms recognized within *A. longiscapus*. Therefore, there remains some doubt about the specific status of *A. hibanus*. Namely, it is possible that *A. hibanus* is not an independent species but a mere geographic form of *A. longiscapus*. However, no information needed for dissolving the problem has been available. I prefer to treat these two forms as two species here, since their distributional ranges seems to be separated enough to preclude gene flow between them.

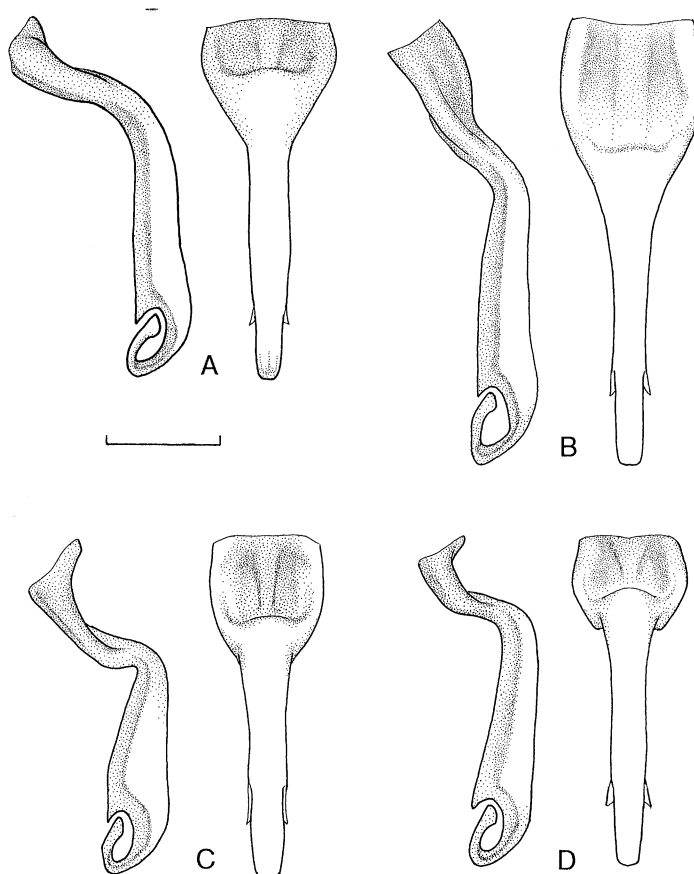


Fig. 6. Epigyna of *Arcuphantes longiscapus* and *A. hibanus*. A–B, *A. longiscapus*: A, Minoo Park, Osaka Pref. (near the type locality); B, Ōkawachi-chō, Hyogo Prefecture. C–D, *A. hibanus*: C, Kumano Shrine, Saijō-chō, Hiroshima Pref.; D, Mt. Sanbe, Shimane Prefecture. (Scale: 0.2 mm.)

***Arcuphantes iharai* SAITO, 1992**

(Figs. 2, 8A–G, 9A–F)

Arcuphantes iharai SAITO, 1992, p. 22, figs. 30–32. (Type locality: Yano-gankai, Jōge-chō, Hiroshima Pref.)

Diagnosis. Distinguishable from the other species of the group by the genital organs. Male palp: cymbium with a hook; paracymbium as shown in Fig. 8A–G. Epigynum intermediate in size in the group, basal part large and swollen (Fig. 9A–F).

Distribution. Hiroshima Pref. (except for the northeastern part which is occupied by *A. hibanus*), western part of Shimane Pref., southwestern and northeastern

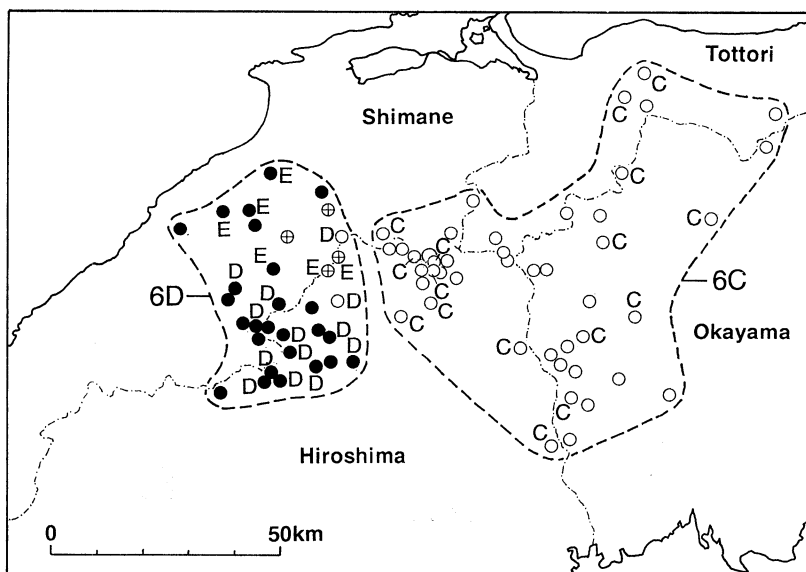


Fig. 7. Geographic variation of *Arcuphantes hibanus*. Alphabets indicate the morphology of male palp which correspond to Figs. 4–5 (C–E). Broken lines delineate ranges of two forms recognized by the epigynal morphology, which correspond to Figs. 6C and 6D. Circles indicate coloration pattern of legs: solid circles, legs with annulation; crossed circles, legs with faint annulation; open circles, legs without annulation.

part of Okayama Pref., southeastern part of Tottori Pref. (Yazu-gun) and western part of Hyogo Pref., western Honshu. Kagawa Pref., northern part of Tokushima Pref. and easternmost part of Ehime Pref., Shikoku (Fig. 1).

Variation. This species has a wide range of distribution compared with others of the group, and it shows remarkable geographic variation in the genital morphology (Figs. 8A–G, 9A–F, 10). Six geographic forms can be recognized by the shape of epigynum and the distributional range. Principal differences of the epigynal shape are in basal part; that is, degree of swell, length and curvature in ventral view (Fig. 9). In the eastern four forms (9C, 9D, 9E and 9F in Fig. 10), distributional pattern of the shape of male palpal paracymbium corresponds to that of epigynal shape. On the other hand, western two forms (9A and 9B in Fig. 10) are each divided into three subgroups tentatively by the shape of male palpal paracymbium. Coloration and length of legs also vary among the populations.

Remarks. The geographic variation in genital morphology seems to be more or less continuous from population to population, and no distinct forms can be clearly separated.

Arcuphantes saitoi n. sp.

(Fig. 11A–C)

Arcuphantes longiscapus (OI): YAGINUMA, 1970, p. 625, fig. 3.

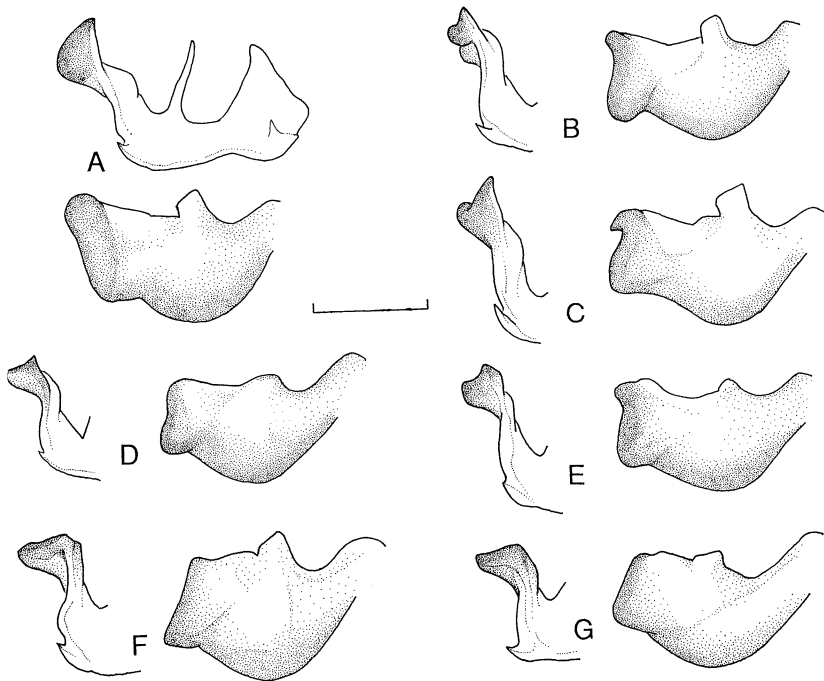


Fig. 8. Variation of male palpal paracymbium in *Arcuphantes iharai*. A–G, paracymbium of left palp: A, Yano-Gankai, Jôge-chô, Hiroshima Pref. (type locality); B, Kameidani, Hikimi-chô, Shimane Pref.; C, Nabara Gorge, Hiroshima-shi, Hiroshima Pref.; D, Innoshima-shi, Hiroshima Pref.; E, Koito Pass, Anabuki-chô, Tokushima Pref.; F, Wakasa-chô, Tottori Pref.; G, Tomi-son, Okayama Prefecture. (Scale: 0.2 mm.)

Diagnosis. Distinguishable from the other species of the group by the genital organs.

Description. Male (holotype). Measurements (in mm). Body length 2.4; carapace length 1.18, width 1.02; abdomen length 1.3, width 0.7. Length of legs (femur/patella/tibia/metatarsus/tarsus; total): Leg I: 1.96/0.32/2.12/1.94/1.08; 7.42, Leg. II: 1.68/0.30/1.72/1.62/0.88; 6.20, Leg III: 1.34/0.28/1.18/1.22/0.62; 4.64, Leg IV: 1.84/0.30/1.72/1.66/0.82; 6.34. Tm I: 0.15.

Legs intermediate in length in the group, with dark annulations at both ends and middle of femora, tibiae and metatarsi. Leg IV longer than leg II.

Palp: cymbium with two hooks; paracymbium and lamella as shown in Fig. 11A–B.

Female. Measurements (in mm; one of paratypes). Body length 2.5; carapace length 1.00, width 0.82; abdomen length 1.7, width 1.0; Length of Legs (femur/patella/tibia/metatarsus/tarsus; total): Leg I: 1.66/0.34/1.64/1.60/0.92; 6.16, Leg II: 1.52/0.32/1.48/1.40/0.82; 5.54, Leg III: 1.22/0.28/1.04/1.04/0.56; 4.14, Leg IV: 1.62/0.30/1.50/1.42/0.74; 5.58. Tm I: 0.17.

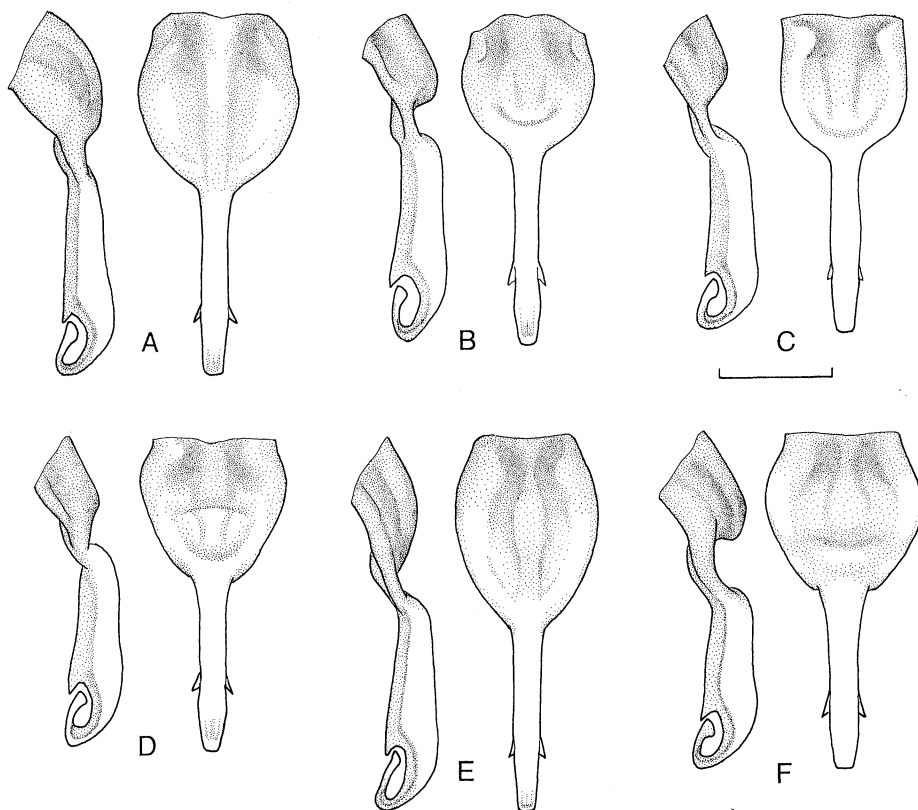


Fig. 9. Variation of epigynum in *Arcuphantes iharai*. A–F, female epigynum: left, lateral view; right, ventral view. A, Yano-Gankai, Jôge-chô, Hiroshima Pref. (type locality); B, Kameidani, Hikimi-chô, Shimane Pref.; C, Innoshima-shi, Hiroshima Pref.; D, Koito Pass, Anabuki-chô, Tokushima Pref.; E, Ashizu Valley, Chizu-chô, Tottori Pref.; F, Tomi-son, Okayama Prefecture. (Scale: 0.2 mm.)

Epigynum relatively short, basal part short, bent and wider than long (Fig. 11C).

Type series. Holotype (♂) and paratypes (1♂3♀): Yasudaseki Hakuta-chô, Nogi-gun, Shimane Pref., Japan, 10–VII–1992, Y. IHARA.

Distribution. Eastern part of Shimane Pref. and western part of Tottori Pref., western Honshu.

Variation. No prominent variation was found in the morphology of male palp and female epigynum among populations.

Remarks. Distributional area of this species is contiguous to that of *A. hibanus*. In some populations of the marginal area of the distribution, this species is sympatrically found with *A. hibanus* with no indication of hybridization. Thus, it is reasonable to regard that *A. saitoi* and *A. hibanus* are two distinct biological species.

This species was first record from Is. Daikon in Nakaumi Lake, Shimane Pref., as *Arcuphantes longiscapus* by YAGINUMA (1970).

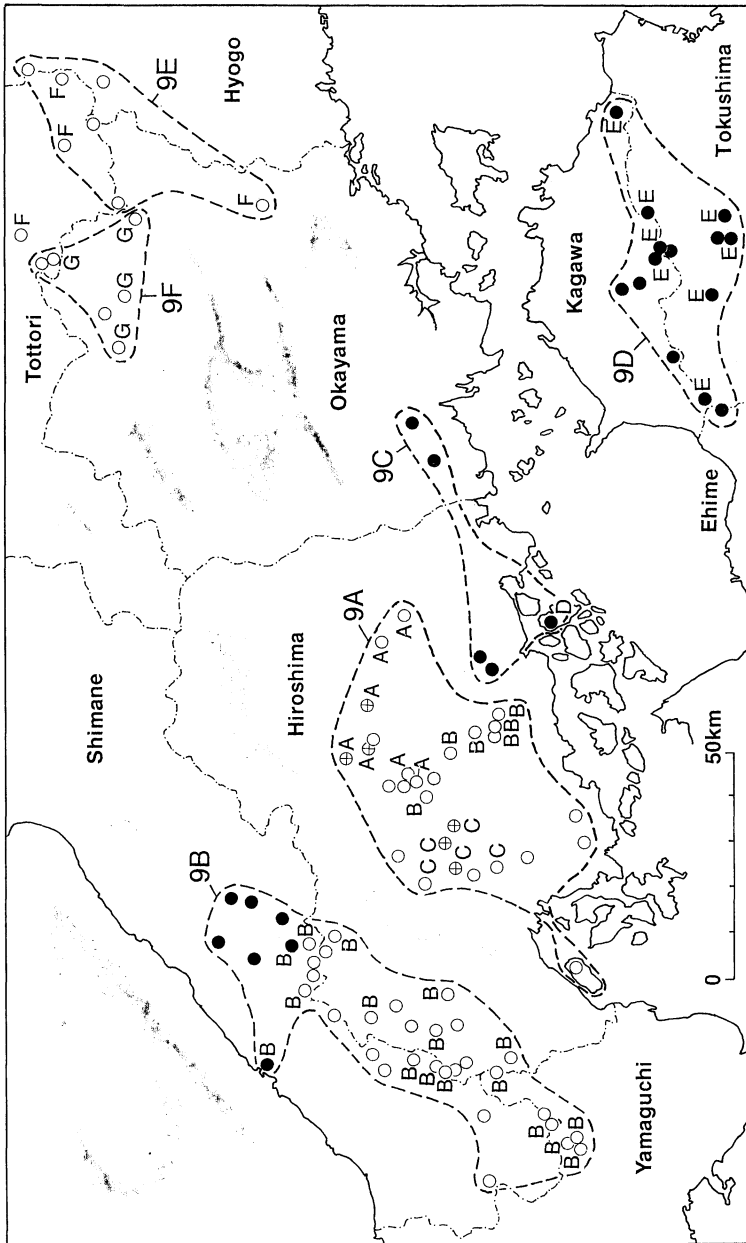


Fig. 10. Geographic variation of *Arcuphantes iharai*. Alphabets, which correspond to those in Fig. 8, indicate the morphology of male palpal paracymbium. Broken lines delineate ranges of epigynal forms shown in Fig. 9 (A–F). Circles indicate coloration pattern of legs: solid circles, legs with annulation; crossed circles, legs with faint annulation; open circles, legs without annulation.

Etymology. The specific name honors Mr. Hiroshi SAITO, Yamanashi, who is an expert in taxonomy of Linyphiid spiders.

Arcuphantes setouchi n. sp.

(Fig. 11D-H)

Diagnosis. Distinguishable from the other species of the group by the genital organs.

Description. Male (holotype). Measurements (in mm). Body length 2.4; carapace length 1.08, width 0.92; abdomen length 1.3, width 0.8. Length of legs (femur/patella/tibia/metatarsus/tarsus; total): Leg I: 1.74/0.32/1.86/1.74/1.00; 6.66, Leg II: 1.54/0.30/1.52/1.42/0.80; 5.58, Leg III: 1.20/0.28/1.04/1.06/0.58; 4.16, Leg IV: 1.64/0.28/1.52/1.44/0.70; 5.58. Tm I: 0.18.

Legs slightly short, with dark annulation. Leg II as long as leg IV.

Palp: cymbium with a hook; paracymbium with a bluntly pointed distal apophysis (Fig. 11D-F); lamella as shown in Fig. 11G.

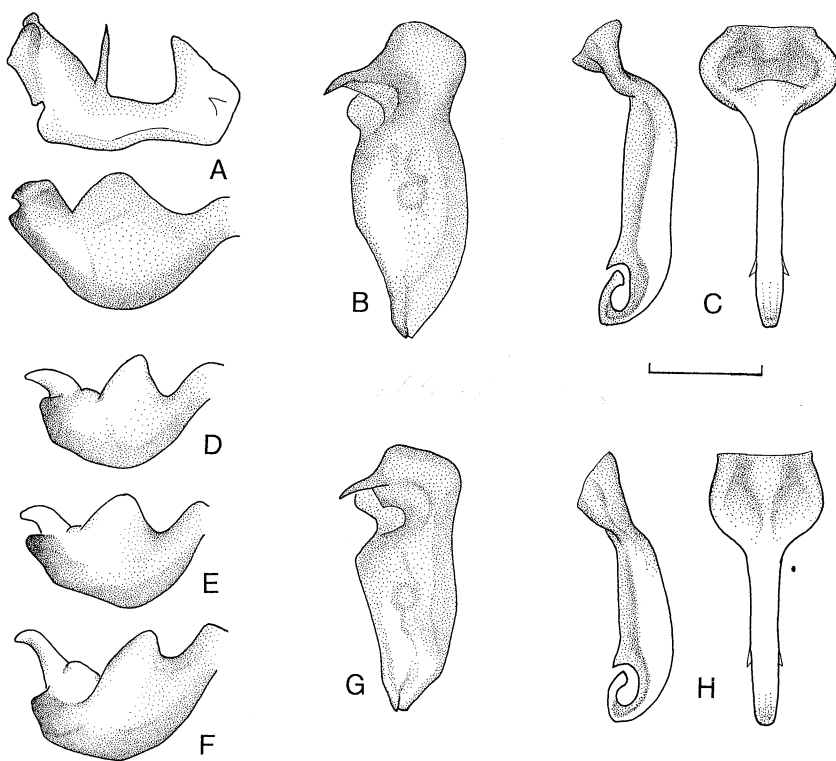


Fig. 11. *Arcuphantes saitoi* and *A. setouchi*. A-B, D-G, Male left palp: A, D-F, paracymbium; B, G, lamella. C, H, Female epigynum: left, lateral view; right, ventral view. A-C, *A. saitoi*: A-B, holotype; C, paratype. D-H, *A. setouchi*: D, Yoshinaga-chô, Okayama Pref., (Honshu); E, G, holotype, (Is. Shôdo); F, Nagao-dani, Sangawa-chô, Kagawa Pref., (Shikoku). H, Paratype. (Scale: 0.2 mm.)

Female. Measurements (in mm; one of paratypes). Body length 2.3; carapace length 1.00, width 0.84; abdomen length 1.5, width 1.0. Length of legs (femur/patella/tibia/metatarsus/tarsus; total): Leg I: 1.64/0.32/1.68/1.50/0.92; 6.06, Leg II: 1.48/0.32/1.44/1.32/0.80; 5.36, Leg III: 1.18/0.30/1.02/0.96/0.56; 4.02, Leg IV: 1.60/0.30/1.40/1.32/0.74; 5.36. Tm I: 0.19.

Epigynum relatively short, scape short, basal part relatively straight (Fig. 11H).

Type series. Holotype (♂) and paratypes (1♂2♀): Kankakei Gorge, Uchinomi-chô, Shôzu-gun, (Is. Shôdo), Kagawa Pref., Japan, 10–VII–1994, Y. IHARA.

Distribution. Southeastern part of Okayama Pref., western Honshu, a part of Kagawa Pref., Shikoku and Is. Shôdo (Fig. 1).

Variation. Males of a population (Nagaodani) in Shikoku slightly differ from those of Honshu and Shôdo Island in shape of palpal paracymbium. Their distal apophyses are longer than those of others (compare, Figs. 11F with D–E).

Remarks. Distributional area of this species is contiguous to that of *A. iharai*. The gap is significant in genital morphology between both species, though *A. iharai* shows gradual geographic variation in those genital characters.

On the other hand, this species closely resembles *A. saitoi* in the genital morphology as illustrated in Fig. 11. Therefore, it can be reasonably concluded that they are closest relatives one another, though their distributional ranges are widely separated by the intervening populations of *A. hibanus*, *tsurusakii* and *iharai*. In the recognition of the species, I also adopted here the same policy as in the case of the *A. longiscapus*-*A. hibanus*.

Etymology. The specific epithet is a noun in apposition.

Arcuphantes tsurusakii n. sp.

(Fig. 12A–C, E–F, H)

Diagnosis. The shape of male palp (lamella and paracymbium) and female epigynum are distinct enough to separate this species from others of the group.

Description. Male (holotype). Measurements (in mm). Body length 2.5; carapace length 1.23, width 1.04; abdomen length 1.4, width 0.8. Length of legs (femur/patella/tibia/metatarsus/tarsus; total): Leg I: 2.34/0.36/2.52/2.32/1.24; 8.78, Leg II: 2.02/0.36/2.06/1.90/1.00; 7.34, Leg III: 1.60/0.34/1.42/1.40/0.72; 5.48, Leg IV: 2.14/0.34/2.00/1.94/0.94; 7.36. Tm I: 0.15.

Legs relatively long, without dark annulation. Leg II almost as long as leg IV.

Palp: cymbium with a hook; paracymbium as shown in Fig. 12A; lamella relatively long correspondingly with elongated epigynum (Fig. 12E).

Female. Measurements (in mm; one of paratypes). Body length 2.8; carapace length 1.12, width 0.92; abdomen length 1.9, width 1.2. Length of legs (femur/patella/tibia/metatarsus/tarsus; total): Leg I: 2.10/0.36/2.18/1.98/1.14; 7.76, Leg II: 1.88/0.36/1.84/1.70/0.96; 6.74, Leg III: 1.42/0.32/1.26/1.26/0.66; 4.92, Leg IV: 1.88/0.34/1.76/1.68/0.86; 6.52. Tm I: 0.18.

Epigynum relatively long and slender, basal part narrowed (Fig. 12H).

Type series. Holotype (♂) and paratypes (3♀): Osakabegawa Dam, Niimi-shi, Okayama Pref., Japan, 24–V–1991, Y. IHARA.

Distribution. Northern part of Okayama Pref. and western part of Tottori Pref., western Honshu, Japan (Fig. 1).

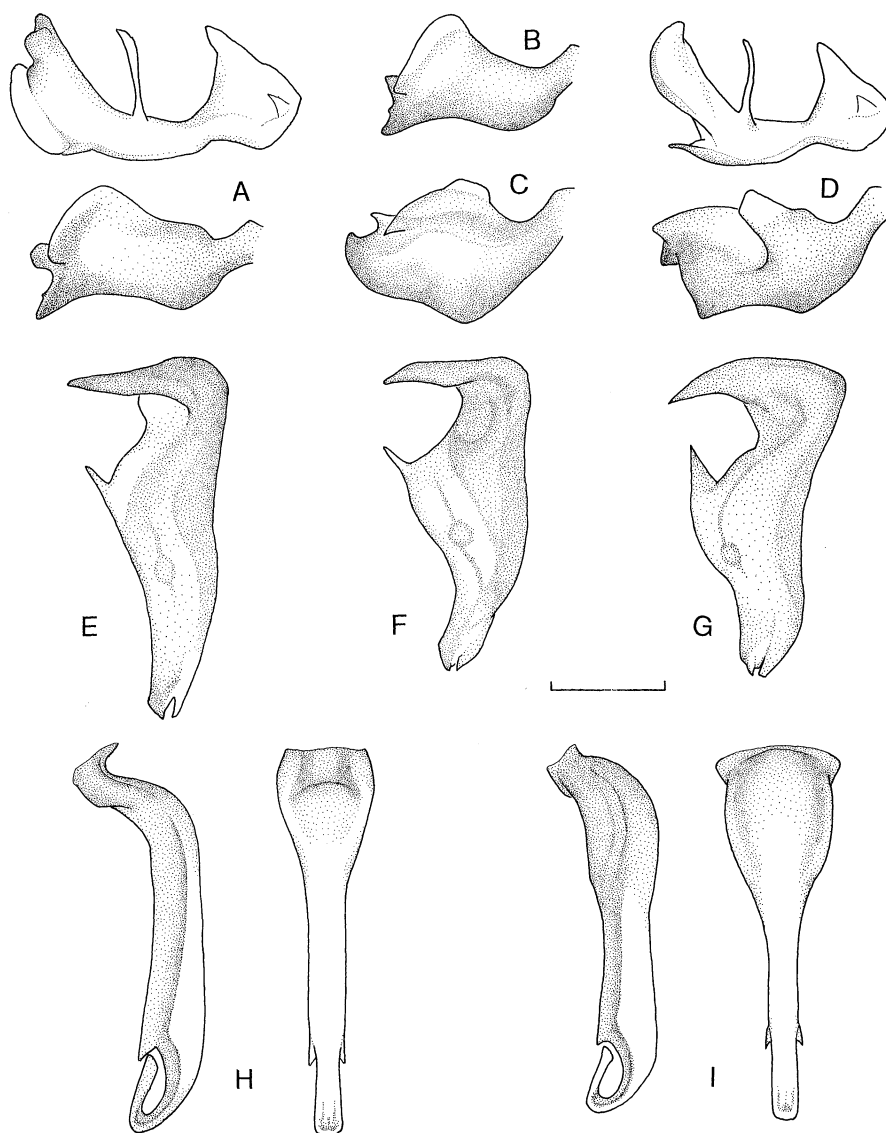


Fig. 12. *Arcuphantes tsurusakii* and *A. nojimai*. A-G, Male left palp: A-D, paracymbium; E-G, lamella. H-I, Female epigynum: left, lateral view; right, ventral view. A-C, E-F, H, *A. tsurusakii*: A, E, holotype; B, Kamisaibara-son, Okayama Pref.; C, F, Kamogawa-chô, Okayama Pref.; H, paratype. D, G, I, *A. nojimai*: D, G, holotype; I, paratype. (Scale: 0.2 mm.)

Variation. Length of epigynum is variable among the populations from 0.59 to 0.81 mm. This variation is clinal; that is, epigynum is longest in the southwestern area of the distribution including type locality, and decrease its length toward north

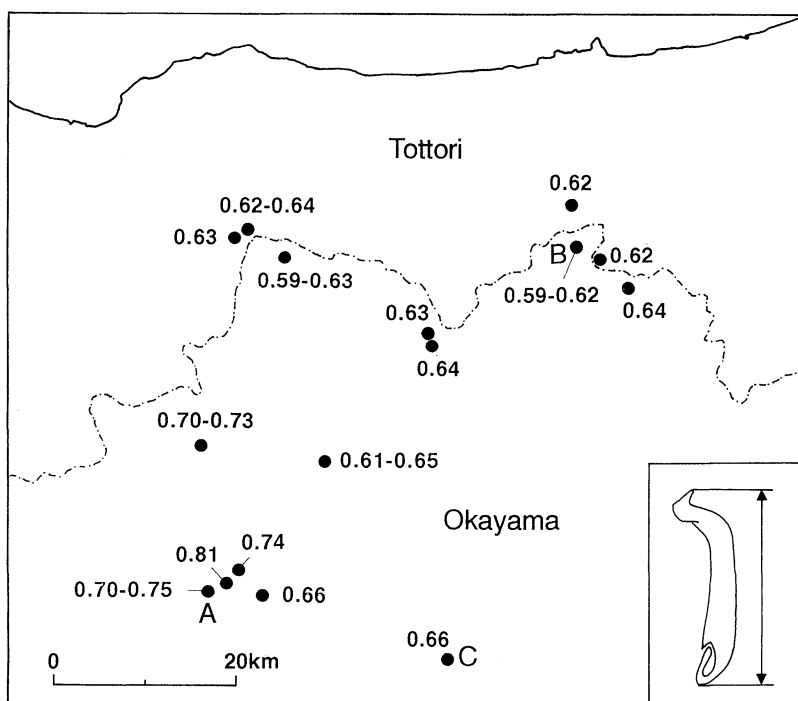


Fig. 13. Length of epigynum in *Arcuphantes tsurusakii*. Figures (in mm) represent the length of epigynum. Alphabets, which represent variation of male palpal paracymbium, correspond to Fig. 12 (A-C).

and east (Fig. 13). Similar trend was also found in the length of legs, which is longest in the southwestern populations and shortest in the northern and eastern populations. These facts indicate that both lengths of epigynum and legs may be influenced by the same genetical basis.

On the other hand, specimens from Takatomi, Kamogawa-chô (Fig. 13C) showed a slight but consistent difference from the other populations in the shape of palpal paracymbium of males (compare Figs. 12C with A-B). These specimens from Takatomi also exhibited dark annulations in their legs, which are absent in the specimens from other populations.

Remarks. The overall distributional range of this species overlaps that of *A. hibanus*, though the population from which both species are actually collected at the same time seems to be relatively scarce (Fig. 1).

Etymology. The specific name honors Dr. Nobuo TSURUSAKI, Tottori University.

Arcuphantes nojimai n. sp.

(Fig. 12D, G, I)

Diagnosis. Distinguishable from the other species of the group by the genital

organs.

Description. Male (holotype). Measurements (in mm). Body length 2.4; carapace length 1.10, width 0.92; abdomen length 1.4, width 0.9. Length of legs (femur/patella/tibia/metatarsus/tarsus; total): Leg I: 1.96/0.32/1.98/1.76/1.02; 7.04, Leg II: 1.56/0.30/1.62/1.48/0.86; 5.82, Leg III: 1.22/0.30/1.10/1.08/0.62; 4.32, Leg IV: 1.64/0.30/1.58/1.48/0.78; 5.78. Tm I: 0.16.

Legs intermediate in length, without dark annulation. Leg II almost as long as leg IV.

Palp: cymbium with a hook; paracymbium and lamella as shown in Fig. 12D, G.

Female. Measurements (in mm; one of paratypes). Body length 2.3; carapace length 1.00, width 0.82; abdomen length 1.6, width 1.0. Length of legs (femur/patella/tibia/metatarsus/tarsus; total): Leg I: 1.56/0.32/1.62/1.46/0.72; 5.88, Leg II: 1.40/0.32/1.36/1.26/0.76; 5.10, Leg III: 1.10/0.30/0.94/0.92/0.56; 3.82, Leg IV: 1.48/0.28/1.36/1.28/0.68; 5.08. Tm I: 0.18.

Epigynum relatively long, basal part narrowed but slightly swollen (Fig. 12I).

Type series. Holotype (♂) and paratypes (3♀): Kogaino, Yamasaki-chô, Shisô-gun, Hyogo Pref., Japan, 30–XII–1989, Y. IHARA.

Distribution. Western part of Hyogo Pref. (Shisô-gun) and northeasternmost of Okayama Pref. (Aida-gun), western Honshu (Fig. 1).

Variation. No prominent variation was found in the morphology among the populations, probably due partly to its small range of distribution.

Remarks. This species is sympatrically found with *A. iharai* in a population (Wakasugi) in the northwestern marginal area of the distributional range. It testifies that both species are reproductively isolated from each other.

This species most closely resembles *A. tsurusakii*, but is clearly separated from it by wider basal part of epigynum and shape of male palpal paracymbium and lamella.

Etymology. The specific name honors Mr. Kôichi NOJIMA, Okayama, who first collected the specimens.

Arcuphantes okiensis n. sp.

(Fig. 14A–L)

Diagnosis. The shape of male palp (lamella and paracymbium) and female epigynum are distinct enough to separate this species from others of the group.

Description. Male (holotype). Measurements (in mm). Body length 2.4; carapace length 1.12, width 0.96; abdomen length 1.4, width 0.8. Length of legs (femur/patella/tibia/metatarsus/tarsus; total): Leg I: 1.78/0.32/2.00/1.78/1.00; 6.88, Leg II: 1.60/0.30/1.68/1.52/0.86; 5.96, Leg III: 1.28/0.26/1.16/1.16/0.60; 4.46, Leg IV: 1.98/0.28/1.72/1.60/0.82; 6.40. Tm I: 0.15.

Legs with dark annulation. Leg IV longer than leg II.

Palp: cymbium with two hooks; paracymbium as shown in Fig. 14A, the apical part of lamella well developed (Fig. 14E).

Female. Measurements (in mm; one of paratypes). Body length 2.5; carapace length 0.96, width 0.84; abdomen length 1.7, width 1.1. Length of legs (femur/patella/tibia/metatarsus/tarsus; total): Leg I: 1.62/0.36/1.70/1.50/0.96; 6.14, Leg II:

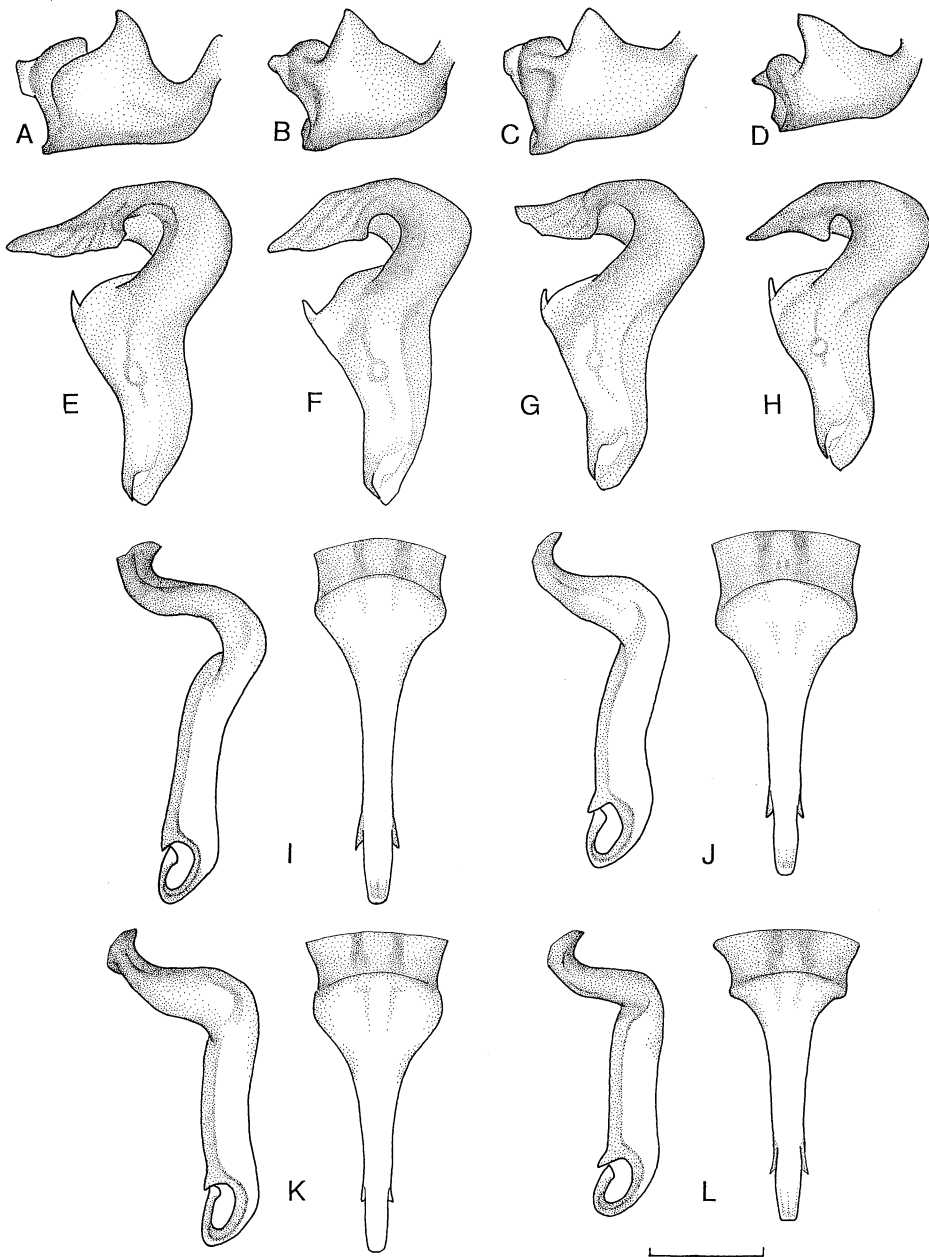


Fig. 14. *Arcuphantes okiensis*. A-H, Male left palp: A-D, paracymbium; E-H, lamella. I-L, Female epigynum: left, lateral view; right, ventral view. A, E, I: holotype and paratype, Tsuma-son, Is. Dôgo. B, F, J, Ama-chô, Is. Nakanoshima. C, G, K, Nishinoshima-chô, Is. Nishinoshima. D, H, L, Chibu-son, Is. Chiburi. (Scale: 0.2 mm.)

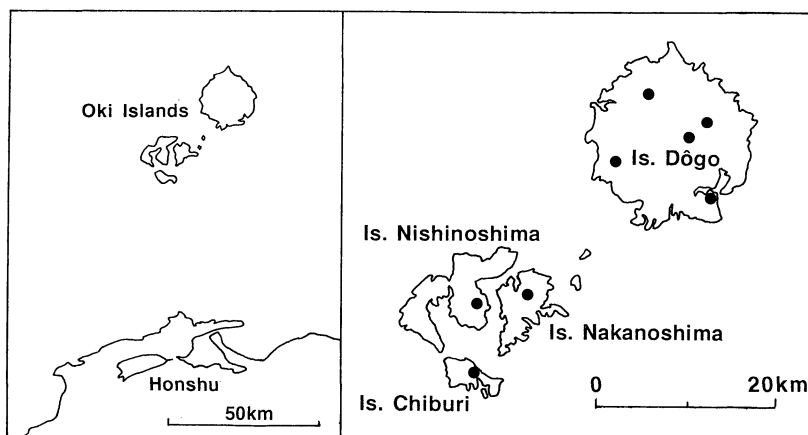


Fig. 15. Distribution of *Arcuphantes okiensis* in the Oki Islands.

1.48/0.34/1.44/1.36/0.82; 5.44, Leg III: 1.20/0.28/1.02/1.04/0.60; 4.14, Leg IV: 1.60/0.30/1.44/1.38/0.78; 5.08. Tm I: 0.19.

Epigynum intermediate in size, basal part strongly bent (Fig. 14I–L).

Type series. Holotype (♂) and paratypes (2♀): Kaminagu, Tsuma-son, Oki-gun, Shimane Pref., Japan, 7–II–1995, Y. IHARA.

Distribution. Known only from Oki Islands, in the Sea of Japan, about 60 km apart from Honshu (Fig. 1).

Variation. The Oki islands consists of four main islands; Dôgo, Nakanoshima, Nishinoshima and Chiburi (Fig. 15). Geographic variation in the genital morphology is found among the populations from each island (Fig. 14). The morphological differences of male palpal paracymbium and lamella and female epigynum are remarkable between the specimens from Is. Dôgo (Fig. 14A, E, I) and Is. Chiburi (Fig. 14D, H, L). On the other hand, specimens from Is. Nakanoshima and Is. Nishinoshima resemble each other in genital morphology, and show intermediate conditions in size and shape of genital organs between those of Is. Dôgo and Is. Chiburi.

Remarks. This species, especially population from Is. Chiburi, closely resembles *A. hokkaidanus*, which has been recorded from Hokkaido, in the shape of genital organs. However their distributional ranges are far away by sufficient distance to preclude gene flow.

Etymology. The specific name is after Is. Oki.

List of specimens examined in this study

Abbreviation used: NT=Nobuo TSURUSAKI, KN=Kôichi NOJIMA, YI=Yoh IHARA.

Arcuphantes longiscapus. OSAKA PREF. Minoo-shi, Minoo Park (near the type locality), 9♂ 19♀, 21–VI–1994, YI. KYOTO PREF. Funai-gun: Sonobe-chô, Ruri-kei Gorge, 4♂ 14♀, 6–VI–1991, YI; Wachi-chô, Simo-otomi, 1♂ 3♀, 5–VI–1991, YI. HYOGO PREF. Taki-gun, Sasayama-

chô, Mt. Koganedake, 1♂3♀, 6-VI-1991, YI. Kanzaki-gun: Ôkawachi-chô, Takakura, 1♂4♀, 26-IX-1992, KM; 1♂5♀, 30-IV-1994, YI; Fukusaki-chô, Nakusa-no-taki Falls, 4♀, 29-IV-1994, YI.

Arcuphantes hibanus. HIROSHIMA PREF. Hiba-gun, Tôjô-chô: Mt. Dôgo (near the type locality), 1♀, 18-XI-1989, YI; Mochimaru, 1♀, 18-XI-1989, YI; About 1 km south of Tôjô Interchange of the Chugoku Highway, 2♂5♀, 12-VII-1991, YI. Saijô-chô: Yuki, Nakagumi, 1♀, 22-IX-1991, YI; Kajitani, 2♀, 14-IV-1991, YI; 2♀, 22-IX-1991, YI; Rokunohara, Prefectural Forest Park, 2♀, 14-IV-1991, YI; 4♀, 6-XI-1993, YI; Mt. Tateeboshi, 3♂4♀, 10-X-1989, YI; 1♂, 27-IX-1992, YI; 1♀, 5-IX-1993, YI; Mt. Ikenodan, 1♂, 2-IV-1989, YI; Kamishakuda, 1♂2♀, 10-X-1989, YI; 2♀, 27-IX-1992, YI; Kumano Shrine, 3♀, 10-X-1989, YI; 4♂6♀, 16-VI-1990, YI; 3♀, 1-XI-1991, NT; 1♀, 27-IX-1992, YI; Mt. Kenashi, 1♂2♀, 1-XI-1991, NT; Bôjidawa Pass, 1♂1♀, 5-XI-1991, NT. Takano-chô: Tawarabara, 1♀, 18-VI-1989, YI; Mt. Sarumasa, 2♀, 23-XI-1989, YI; Mt. Yubitani, 2♂1♀, 15-X-1989, YI; 1♂, 13-XI-1990, YI; 1♀, 5-XI-1993, YI; Kusandawa Pass, 3♀, 23-XI-1989, YI; 3♂2♀, 6-VIII-1990, NT. Hiwa-chô: Mt. Hiba, 3♀, 6-XI-1993, YI; Mt. Azuma, 1♀, 2-IV-1989, YI; 1♂2♀, 16-VI-1990, YI; 1♀, 12-XI-1990, YI; Kogoro, Shimoyama, 1♂3♀, 25-XI-1990, YI; Koyabara, 2♀, 12-XI-1990, YI. Kuchiwa-chô, Takechidani, 1♀, 11-VI-1989, YI; 1♂2♀, 6-VIII-1989, YI; 4♂12♀, 21-VI-1992, YI. Futami-gun, Funo-son: Shimofuno, Yachiyo Falls, 3♂4♀, 3-XI-1989, YI; 1♂1♀, 26-X-1991, YI; Kamifuno, Shirinashidani, 2♀, 14-X-1994, YI; Suidani, 1♀, 26-X-1991, YI; 3♀, 14-X-1994, YI. Kimita-son, Moda, 1♂1♀, 20-X-1991, YI. Sakugi-son: Jôsei-daki Falls, 5♀, 3-IX-1989, YI; 1♂2♀, 30-IX-1990, YI; 1♂, 21-III-1991, YI; Sunaidani, 1♂1♀, 24-X-1994, YI. Miyoshi-shi: Yamaga-machi, 2♀, 3-IV-1990, YI; Anagasa-machi, Simogô, 3♂4♀, 17-X-1992, YI. Takata-gun, Takamiya-chô: Simosikijiki, 1♂, 5-X-1993, YI; Mitadani, 1♀, 21-III-1991, YI; Kawane, 2♂1♀, 3-IX-1989, YI; Kawane, Takusa, 3♀, 5-X-1993, YI; Kawane, Kametani, 1♂1♀, 5-X-1993, YI; Kawane, Niedani, 1♂6♀, 29-X-1992, YI. Midori-chô, Uchiyama, 2♀, 4-III-1990, YI. Fukuyama-shi, Yamano-chô, Ryûzu Gorge, 1♂7♀, 23-IX-1989, YI. SHIMANE PREF. Nita-gun, Yokota-chô: Mt. Sentsû, 2♀, 12-XI-1989, YI; Sakane, 2♀, 14-IV-1991, YI. Nita-chô, Kamiai, 3♂3♀, 15-X-1989, YI. Iishi-gun, Tonbara-chô, Mt. Ôyorogi: 2♂3♀, 11-III-1990, YI; 3♂10♀, 9-IX-1990, YI; 4♀, 21-X-1990, YI; 6♀, 18-X-1992, YI. Akagi-chô: Maruyama, 2♀, 3-XI-1989, YI; Hodohara, 1♂3♀, 11-III-1990, YI. Kakeya-machi: Yaedaki Falls, 4♀, 21-IV-1990, YI; 1♀, 24-III-1991, YI; Ryûzugadaki Falls, 1♀, 21-IV-1990, YI. Hikawa-gun, Sada-chô, Shimohashinami, 3♂11♀, 7-VII-1990, YI. Ôda-shi, Ômori-chô: Iwami-ginzan, 6♀, 22-VII-1990, YI; Ido Shrine, 3♀, 8-XI-1990, YI. Sanbe-chô, Nojiro, 1♂13♀, 7-VII-1990, YI. Mt. Sanbe: Kitanohara, 3♂9♀, 3-XI-1989, YI; Shigaku-chô, 1♀, 24-IX-1994, YI. Ôchi-gun, Daiwa-mura: Kadoya, 4♀, 9-IX-1990, YI; Kamino, 1♂1♀, 4-III-1990, YI; Hihira, 1♂1♀, 28-X-1990, YI. Hasumi-mura, Uzui, 1♀, 9-IX-1990, YI. Ôchi-chô, Hananotani: 1♀, 19-III-1993, YI; 1♂, 23-IX-1994, YI. Kawamoto-chô, Ômakidani, 5♀, 4-III-1990, YI. OKAYAMA PREF. Atetsu-gun, Shingô-chô: Aozasa, 2♀, 12-XI-1989, YI; Mimuro Gorge, 1♀, 20-X-1990, YI. Tetta-chô: Kônoike, Taibara, 2♀, 13-V-1992, YI; 1♀, 10-XI-1992, YI; Oizako, 1♂1♀, 10-XI-1992, YI; The northeastern foot of Mt. Suishô, 3♀, 24-V-1991, YI. Niimi-shi: Bessho, 4♂7♀, 15-IV-1990, YI; Ichikura-dawa Pass, 3♀, 15-IV-1990, YI; Rashômon, 1♂1♀, 23-XII-1989, KN. Kawakami-gun, Bicchû-chô: Nishiyama, The southeastern foot of Mt. Takayama, 1♀, 30-VII-1992, YI; Nishiyama, The northern area of Shin-Nariwagawa Dam, 1♀, 20-XII-1991, YI; 3♀, 24-II-1992, YI; Shin-Nariwagawa Dam, 4♀, 22-XI-1992, KN; Iwaya Gorge, 2♀, 31-XII-1989, KN; 1♀, 31-XII-1989, YI; Fuka, 1♂4♀, 23-IX-1989, YI; Yuno, 2♀, 12-XI-1990, KN. Nariwa-chô, Haya-ma Gorge, 1♀, 9-XI-1991, KN. Takahashi-shi, Ôkubo, 1♀, 23-XII-1989, KN. Shitsuki-gun, Yoshii-chô, Ja-no-ana Cave (outside cave), 2♀, 17-X-1993, YI. Maniwa-gun: Shinjô-son, Mt. Kenashi, 1♂5♀, 24-IX-1989, KN & YI; Kuse-chô, Ashiodaki Falls, 2♂1♀, 18-VII-1991, NT. Tomata-gun, Okutsu-chô, Prefectural Forest Park, 1♀, 28-VII-1989, NT. TOTTORI PREF. Hino-gun: Nichinan-chô, Mt. Inazumi, 1♀, 3-VIII-1989, NT; Kôfu-chô, Shinkoya Pass, 1♀, 14-VII-1991, YI. Saihaku-gun: Daisen-chô, Mt. Daisen, Daisenji Temple, 1♂1♀, 14-V-1989, NT; Nakayama-chô, Hagiwara, 4♀, 18-VII-1990, YI. Tôhaku-gun: Akasaki-chô, Mt. Senjô, 1♂1♀, 16-IX-1990, YI; Misasa-chô, Fukuyoshi, 1♀, 14-VII-1991, YI.

Arcuphantes iharai. HIROSHIMA PREF. Saeki-gun, Yoshiwa-mura: Nakatsuya, 3♀, 13-

VIII-1989, YI; Yoshiwahigashi, 2♀, 6-X-1991, YI; Hachirô, 1♀, 6-X-1992, YI. Saiki-chô, Iino-yama, 1♂1♀, 3-XI-1993, YI. Miyajima-chô, Momijidani to Mt. Misen, 1♀, 19-II-1989, YI. Yamagata-gun, Tsutsuga-son, Ryûzu Gorge, 1♂, 15-VII-1989, YI. Geihoku-chô: Mt. Garyû, 1♂3♀, 9-VII-1989, YI; 1♀, 5-X-1989, YI; 5♂5♀, 17-VI-1990, YI; 1♀, 19-VII-1990, NT; 1♂3♀, 24-IX-1990, YI; 3♂2♀, 30-V-1991, YI; 1♀, 16-VIII-1991, YI; The eastern foot of Mt. Tenguishi, 3♀, 15-IX-1993, Megumi IHARA; Ôdani, 2♂6♀, 3-VI-1990, YI. Togôchi-chô: Sakane, 2♀, 9-IX-1989, YI; 3♂1♀, 28-X-1989, YI; 5♂10♀, 17-VI-1990, YI; Yokogawa, Uchiguro Pass, 1♀, 16-IX-1995, YI; Itagatani, 1♀, 18-III-1990, YI. Hiroshima-shi, Higashi-ku, Fukuda, 1♂, 5-VIII-1989, YI. Aki-ku, Nakano: 5♀, 25-VI-1990, YI; 1♀, 13-XII-1990, YI. Asakita-ku, Nabara Gorge: 1♂2♀, 9-I-1989, YI; 2♂4♀, 5-IX-1989, YI; 5♀, 7-I-1990, YI; 1♂1♀, 27-X-1991, YI. Toge, Anagô: 1♂2♀, 27-X-1991, YI; 1♂1♀, 2-X-1992, YI. Nakafukawa, 1♀, 13-XI-1993, YI. Shiraki-chô: Mukaiseto, 1♂1♀, 1-IX-1991, YI; Ichikawa, 5♂3♀, 19-X-1992, YI. Kure-shi, Hiro-ishiuchi, Shiraito-no-taki Falls, 1♀, 1-VI-1989, YI. Kamo-gun, Kôchi-chô: Miyama, 2♂3♀, 10-XI-1989, YI; 2♀, 21-XI-1989, YI; Shimokôchi, 3♀, 7-XI-1994, YI; 1♂2♀, 19-XII-1994, YI; 25♂52♀, 2-V-1995, YI; The northeastern foot of Mt. Takamura, 1♂3♀, 18-VII-1994, YI. Toyosaka-chô, Mt. Itanabe, 1♂1♀, 16-V-1990, YI. Fukutomi-chô, Mt. Takanosu, 3♀, 26-IX-1995, YI. Toyota-gun, Yasuura-chô, Ichihara, Mt. Noro, 1♀, 5-I-1991, YI. Hongô-chô, Jo-ô-daki Falls: 1♂1♀, 5-VII-1989, YI; 1♂4♀, 11-V-1990, YI. Mihara-shi: Takasaka-chô, 4♀, 4-II-1990, YI; Yawata-chô, Mitsugi-hachimangû Shrine, 4♀, 13-X-1995, YI. Innoshima-shi, Shigei-chô, 1♂6♀, 9-VI-1992, YI. Miyoshi-shi, Arihara-machi: Oshiire, 3♂, 10-X-1989, YI; 2♀, 6-V-1990, YI; Gô, 1♀, 11-III-1991, YI. Shimoshiwachi-machi, Setani, 2♂2♀, 5-IV-1992, YI. Takata-gun, Kôda-chô, Shimo-obara, 2♀, 21-IV-1991, YI. Yachiyo-chô, Nakasasai, 1♀, 13-IX-1993, YI. Mukaihara-chô, The southern foot of Mt. Ôzuchi, 2♂2♀, 10-VI-1989, YI; Saka, Nakagumi, 2♀, 16-XII-1990, YI; Sennichi, 2♂5♀, 20-I-1991, YI; Hogaki, Okudani, 2♀, 11-XI-1989, YI; 1♂5♀, 15-I-1990, YI; 1♂2♀, 25-III-1990, YI; 5♀, 14-IV-1990, YI; 1♂1♀, 1-IX-1991, YI. Futami-gun, Kisa-chô: Hinoki, 4♀, 10-III-1991, YI; Ikoi-no-mori, 5♂7♀, 13-X-1994, YI. Kônu-gun, Jôge-chô, Yano-Gankai (type locality): 3♂5♀, 23-X-1988, YI; 2♀, 6-VIII-1989, YI. Fuchû-shi, Aji-chô, Hiradani, 1♂3♀, 21-X-1993, YI. SHIMANE PREF. Kanoashi-gun, Muikaichi-machi: Mt. Azôji, 1♀, 10-XII-1989, YI; Tachigôchi, 2♀, 9-IV-1991, YI; Kôji, 1♂, 28-V-1991, YI. Tsuwano-chô, Sasayama, 1♀, 13-VIII-1989, YI. Naka-gun, Asahi-chô: Kamikitao, 2♀, 1-IV-1990, YI; Uchigahara, 1♂1♀, 1-IV-1990, YI; Ichigi, 2♂3♀, 28-X-1990, YI; Sakamoto, 3♂, 24-X-1993, YI; Taninaka, 1♀, 24-X-1993, YI. Kanagi-chô, Nagata, 1♀, 3-XII-1989, YI. Mino-gun, Hikimi-chô: Hiromi, 1♂4♀, 13-VIII-1989, YI; Urahikimi Gorge, 1♂1♀, 13-VIII-1989, YI; Kameidani, 7♂12♀, 17-VI-1990, YI; Michikawa, 1♂1♀, 20-IV-1993, YI. Mito-chô, Near the entrance of Dôgatao Tunnel, 2♀, 12-V-1992, YI. Hamada-shi, The ruins of Hamada Castle, 2♂1♀, 27-X-1993, YI. Ôchi-gun, Sakurae-chô: Senjô-kei Gorge, 7♀, 28-X-1990, YI; Tani, 1♀, 28-X-1990, YI. Iwami-chô: Dangyo-kei Gorge, 3♀, 22-VII-1990, YI; Kôzui, 1♀, 26-IX-1993, YI. Kawamoto-machi, Inbara, 1♂1♀, 24-VII-1988, YI. YAMAGUCHI PREF. Kuga-gun Nishiki-chô: Usa, 1♂3♀, 23-VII-1989, YI; Konishi, 2♂4♀, 15-IX-1989, YI; Kitani Gorge, 1♂1♀, 15-IX-1989, YI; 1♀, 6-XI-1994, YI. Tsuno-gun, Kano-chô, Mt. Nagano: 1♂, 21-VII-1990, NT; 1♂, 23-X-1994, YI. OKAYAMA PREF. Kasaoka-shi, Osaka, 1♀, 25-X-1989, KN. Kurashiki-shi, Mt. Yataka, 1♀, 23-XI-1993, KN. Tomata-gun: Kagamino-chô, Chûri-no-taki Falls, 2♂1♀, 1-X-1989, KN; Tomi-son, Siraka Valley, 3♂8♀, 19-XI-1989, KN & YI; Okutsu-chô, Okutsu Gorge, 4♀, 19-XI-1989, YI. Katsuta-gun, Nagi-chô, Mt. Takiyama: 1♀, 19-III-1989, KN; 2♂2♀, 22-X-1989, KN. Aida-gun: Aida-chô, Nakagawa, 1♂3♀, 24-VI-1990, KN; Nishiawakura-son, Wakasugi, 1♀, 2-VI-1990, KN. TOTTORI PREF. Yazu-gun, Kawahara-chô, Mitaki Gorge, 1♂, 22-X-1991, YI. Saji-son: Owai, 1♂6♀, 14-X-1990, KN & YI; Naka, San-ô-daki Falls, 6♀, 18-IX-1991, YI. Chizu-chô: The northeastern foot of Mt. Nagi, 1♀, 29-VII-1989, YI; Mitaki Dam, 1♀, 26-XI-1989, NT; Ashizu Valley, 1♂2♀, 14-X-1990, YI. Wakasa-chô, Ochiori, 1♂, 25-VII-1989, NT. HYOGO PREF. Yabu-gun Sekinomiya-chô, The northeastern foot of Mt. Hyônosen, 5♀, 30-VII-1989, YI. Shisô-gun, Haga-chô, Akanishi Valley, 1♀, 30-XII-1989, KN. EHIME PREF. Kawanoe-shi, 3♀, 20-V-1994, YI. KAGAWA PREF. Mitoyo-gun: Saita-chô, Inohana Pass, 2♀, 29-IV-1990, YI; Ônohara-chô, Ebisukui, 4♂4♀, 20-V-1994, YI. Ayauta-gun, Ayakami-chô: Kashiwara Valley, 2♀, 27-VII-1990, YI; Yamasumi, 1♀, 6-XI-1990, KN. Kagawa-gun, Shionoe-chô: Asagiwara, 1♂3♀,

1–XI–1989, YI; Mt. Ryûdô, Campsite, 1♂2♀, 3–X–1990, NT. Ôkawa-gun, Hiketa-chô, Kawamata, 7♂16♀, 21–V–1994, YI. TOKUSHIMA PREF. Mima-gun, Mima-chô, Mt. Ryûdô, 1♀, 3–X–1990, NT. Waki-chô, Hiramata, 1♂9♀, 27–VII–1990, YI. Sadamitsu-chô: Nagase, 10♀, 25–IV–1992, YI; Sarukai, 1♂1♀, 25–IV–1992, YI. Anabuki-chô: Koito Pass, 1♂4♀, 21–IV–1994, YI; Haitate, 2♂14♀, 21–IV–1994, YI. Miyoshi-gun, Mikamo-chô, Nishishô, 1♂4♀, 25–IV–1992, YI.

Arcuphantes saitoi. SHIMANE PREF. Nogi-gun, Hakuta-chô, Same locality as that of holotype: 1♂3♀, 10–VII–1992, KN; 1♂, 25–III–1993, YI. Yasuda: 1♂1♀, 25–IV–1990, YI; 1♂, 9–VII–1992, YI. Yatsuka-gun, Mihonosei-chô: Ui, 1♂, 26–IV–1990, YI; Moriyama, 1♂11♀, 25–VII–1995, YI. Shimane-chô, Kagabessho: 1♂2♀, 26–IV–1990, YI; 1♂2♀, 14–XI–1991, YI. Kashima-chô, Kamikôbu, Yamaoku, 1♀, 14–XI–1991, YI. Higashi-izumo-chô, Kami-itô, Konpira Shrine, 1♀, 10–I–1991, YI. Yakumo-mura: Sudani, 1♂2♀, 26–IV–1990, YI; Kuwanami, 2♂2♀, 15–XI–1991, YI. Matsue-shi: Matsue Castle, 1♀, 17–V–1992, YI; 5♂8♀, 28–VI–1993, YI; Mt. Misaka, 1♀, 14–XI–1991, YI; Mt. Makuragi, Kezôji Temple, 1♂4♀, 14–XI–1991, YI. Nita-gun, Yokota-chô, Mt. Sentsû: 1♂2♀, 12–XI–1989, YI; 2♂4♀, 23–IX–1991, YI; 11♂28♀, 11–VI–1995, M. IHARA & YI. Ôhara-gun, Kisuki-chô, Mano, 1♀, 15–XI–1991, YI. Iishi-gun, Mitoya-chô: Kumomi-kei Gorge, 5♀, 7–VII–1990, YI; Zenjôji Temple, 1♂, 6–X–1995, YI. Kakeya-chô, Ryûzugadaki Falls, 2♂2♀, 21–IV–1990, YI. Tonbara-chô, Shitsumi, 3♂5♀, 7–VII–1990, YI. Hirata-shi, Ichibata-Yakushi Temple, 1♂, 4–XII–1991, YI. Hikawa-gun, Hikawa-chô: Gakutô, 1♀, 7–XI–1990, YI; 1♀, 8–XI–1990, YI; 1♂1♀, 12–V–1993, YI; Kanba, 1♂2♀, 26–III–1993, YI. Sada-chô, Meta-Shinrinkôen, 1♀, 1–X–1995, YI. Izumo-shi, Tachikue Gorge: 2♀, 25–VII–1989, YI; 1♀, 1–X–1995, YI. TOTTORI PREF. Yonago-shi, Kume-chô, 3♀, 27–VIII–1992, YI. Saihaku-gun, Saihaku-chô: Kaminakatani, 1♂3♀, 12–V–1993, YI; Tôjô, 2♂3♀, 11–VII–1991, YI. Daisen-chô, Daisen: 2♀, 18–VII–1990, YI; 2♀, 16–IX–1990, YI. Hino-gun, Mizoguchi-chô, Kamidai, Yakura Pass, 1♀, 11–VII–1991, YI. Nichinan-chô: Mt. Sentsû, 3♂3♀, 3–VIII–1989, Sugawara, Nakahara, 2♀, 12–V–1993, YI; Yato, 1♂6♀, 26–VIII–1992, YI.

Arcuphantes setouchi. KAGAWA PREF. Shôdo Island, Shôzu-gun, Tonoshô-chô, Chôshi Gorge, 10♂18♀, 9–VII–1994, YI. Ôkawa-gun: Sangawa-chô, Nagaodani, 2♂2♀, 31–V–1990, YI; Shirotori-chô, Suzutake, 6♀, 31–V–1990, YI. OKAYAMA PREF. Bizen-shi: Shizutani, 4♀, 24–VI–1990, KN; Ikenada, 3♀, 24–VI–1990, KN. Wake-gun, Wake-chô, Hikasashimo, Kômoto, 1♂5♀, 4–VI–1994, KN. Yoshinaga-chô: Takata, 2♂5♀, 4–VI–1994, KN; Imasaki, Itaya, 4♀, 4–VI–1994, KN; Iwasaki, 1♀, 3–VII–1994, M. IHARA; 1♂14♀, 3–VII–1994, YI.

Arcuphantes tsurusakii. OKAYAMA PREF. Niimi-shi: The upper reaches of Osakabegawa Dam, 1♀, 24–IX–1989, YI; Himesaka-Kanachiana, 1♀, 2–I–1990, KN. Atetsu-gun, Ôsa-chô: The upper reaches of Osakabegawa Dam, 1♀, 24–IX–1989, YI; Ôino, 3♀, 15–IV–1990, YI. Maniwa-gun, Kawakami-son, Kamihiruzen, 1♂2♀, 24–IX–1989, YI; Chûka-son, Mt. Yamanori: 1♂, 10–VI–1990, KN; 1♂1♀, 29–X–1990, KN; Yamanori Valley, 1♀, 28–VII–1989, NT. Katsuyama-chô, Kanba-no-taki Falls: 1♀, 24–IV–1989, NT, 1♂5♀, 24–IX–1989, KN & YI. Tomatagun, Kamo-chô, Iwabuchi, 1♀, 11–VII–1990, KN. Kamisaibara-son, Iwai Falls: 1♂2♀, 14–X–1990, KN; 2♀, 14–X–1990, YI. Mitsu-gun, Kamogawa-chô, Takatomi, 1♂2♀, 18–VI–1990, KN. TOTTORI PREF. Hino-gun, Kôfu-chô: Kagamiganaru, 1♀, 27–VIII–1987, NT; Shinkoya Pass, 2♀, 14–VII–1991, YI. Tôhaku-gun, Misasa-chô, Ojika Valley, 1♀, 14–X–1990, YI. Yazu-gun, Saji-son, Tatsumi Pass, 1♀, 12–X–1989, KN.

Arcuphantes nojimai. HYOGO PREF. Sisô-gun: Same locality and date as those of type specimens, 1♀, KN; Yamasaki-chô, Sugigase, 1♀, 4–V–1993, YI; Haga-chô, Ono, 1♂8♀, 4–V–1993, YI. OKAYAMA PREF. Aida-gun: Nishiawakura-son, wakasugi, 1♀, 2–VI–1990, KN; Higashiawakura-son, Mt. Ushiroyama, 2♀, 4–XII–1989, KN.

Arcuphantes okiensis. SHIMANE PREF. Oki-gun: Is. Dôgo, Saigô-chô, Chôshi, 3♂12♀, 10–V–1995, YI; Mt. Atago, 1♀, 11–V–1995, YI; Goka-mura, Near the entrance of Kumi Tunnel, 1♂8♀, 11–V–1995, YI; Fuse-mura, The northern foot of Mt. Washigamine, 2♀, 9–VIII–1995, YI; Is. Nakanoshima, Ama-chô, Oki Shrine, 15♂27♀, 12–V–1995, YI; Is. Nishinoshima, Nishinoshima-chô, Ôyama, 1♂8♀, 11–V–1995, YI; Is. Chiburi, Chibu-mura, Kurui, 9♂16♀, 12–V–1995, YI.

Acknowledgments

I wish to express my hearty thanks to Dr. Nobuo TSURUSAKI, Tottori University, for his constant guidance, offering specimens and reading the manuscript of this paper. Thanks are also due to Mr. Kôichi NOJIMA, Okayama, for his offering many invaluable specimens, and Mr. Hiroshi SAITO, Yamanashi, for his expert advice. My wife Megumi IHARA also helped me in various ways especially in field collecting of the specimens.

摘 要

Arcuphantes (サラグモ科: ヤミサラグモ属) の *longiscapus* 種群について, 生殖器の形態と地理的な分布パターンにもとづき分類学的改訂を行った. 本種群の種として, *A. longiscapus* ナガエヤミサラグモ, *A. hibanus* ヒバヤミサラグモ, *A. iharai* アキヤミサラグモの3既知種と, *A. saitoi* イズモヤミサラグモ (新称), *A. setouchi* セトヤミサラグモ (新称), *A. tsurusakii* ツルサキヤミサラグモ (新称), *A. nojimai* ハリマヤミサラグモ (新称), *A. okiensis* オキヤミサラグモ (新称) の5新種を記載した. これらの8種は, 本州西部と四国北東部および付近の島に限って分布する. それぞれの種の分布は側所的なパターンを示し, 狭い分布重複域をもつ場合がある. 雄触肢と雌の外雌器の間には, 種特異的な形態の対応が認められる.

References

- EBERHARD, W. G., 1985. Sexual Selection and Animal Genitalia. 244 pp. Harvard University Press, Cambridge.
- HUBER, B. A., 1993. Genital mechanics and sexual selection in the spider *Nesticus cellanus* (Araneae: Nesticidae). *Can. J. Zool.*, **71**: 2437-2447.
- OI, R., 1960. Linyphiid spiders of Japan. *J. Polytech. Osaka City Univ.*, **11** (D): 137-244.
- 1964. A supplementary note on linyphiid spiders of Japan. *J. Biol. Osaka City Univ.*, **15**: 23-30.
- SAITO, H., 1992. New linyphiid spiders of the genus *Arcuphantes* (Araneae: Linyphiidae) from Japan. *Korean Arachnol.*, **8**: 13-31.
- YAGINUMA, T., 1970. The fauna of the insular lava caves in West Japan. *Bull. natn. Sci. Mus., Tokyo*, **13**: 623-629.